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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/721,457	11/20/2000	Christoph Stahl	4028	4924

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EXAMINER

DASTOURI, MEHRDAD

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 04/19/2004

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/721,457

Applicant(s)

STAHL ET AL.

Examiner

Mehrdad Dastouri

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicants, amendment filed February 2, 2004, has been entered and made of record.
2. Applicants are respectfully requested to resubmit a certified copy of the application 199 55 919.8 filed in Germany.
3. Applicants are respectfully requested to provide support for the simultaneous amendment of the same subject matters in Claim 1 and Page 32, Lines 2-22 of the specification
4. Applicants' arguments have been fully considered but they are not persuasive. Murray et al.'s teachings is not limited to recognizing a single object (Column 1, Lines 52-55). Likewise, Lawrence et al.'s invention is not limited to recognizing a single object that has a set of features, by sampling a plurality of local regions of an image. On the contrary, Lawrence et al. deal with different objects on the face such as nose, mouth, etc.(Column 1, Lines 6-8, and 44-57). Prior art of record disclose multiple object recognition based on the following methodology that meet the recited steps (a) to (f):

As it is known in the art of object recognition, conventionally all pixels of received images are utilized for classification purposes. As a standard procedure, foreground pixels are used to form a reduced image, and background pixels or irrelevant pixels are ignored.

The reduced images (homogeneous regions after image segmentation) are filtered to form at least filtered images (conventional preprocessing).

Murray et al. disclose the filtered images are further classified by a group of different classifiers (Classifiers 10, 11, 22 and 23), whereby each classifier works on the basis of learned rules and based on a respective characterizing vector to form classified images.

Murray et al. further disclose the classified images are merged (Assessor unit 12) and a decision is made, based on the merged images, whether any of all remaining pixels are still relevant and if so to which different object class the still relevant pixel belongs.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1- 3, 6, 9 are rejected under 35 U. S. C. 103 (a) as being unpatentable over Murray et al., (hereinafter Murray), US 6597800, and Lawrence et al., (hereinafter Lawrence), US 6038337.

As per claim 1, Murray teaches a method for multiple object recognition (Column 1, Lines 52-56) on an image pixel plane of received images comprising the following steps:

(a) roughly classifying (10) all pixel points of said received images whether or not a pixel point is relevant for said multiple object recognition to provide relevant (part of

the object) pixel points and eliminate irrelevant pixel points (Column 1, Lines 47-56;
Column 4, Lines 22-43);

(b) forming a reduced image (11) based on said relevant pixel points as roughly
classified in step (a) (Binarization; Column 4, Lines 27-30);

(c) filtering (20) each reduced image (11) for forming at least two corresponding
decomposed or filtered images (21, 22, 23) (binary mask, Column 4, Lines 30-33 and
Sobel filter, Column 4, Lines 37-40) whereby image components relevant for said
multiple object recognition (object pixels (binary mask), object boundary (Sobel filter))
are retained in said at least two filtered images (Filtering homogeneous regions
simultaneously filters all objects of interest that will generate a plurality of filtered
images);

(d) further classifying (30) said at least two filtered images for providing classified
images, wherein said further classifying is performed by a group of different classifiers
(Classifier 10 and 22, Fig. 1) which operate in accordance with learned rules to allocate
said classified images to different object classes, wherein each different classifier works
independently of any other classifier of said group of different classifiers (Figure 1;
Column 1, Lines 57-67, Column 2, Lines 40).

Murray does not specifically teach that his classifiers use a characterizing vector,
however, Lawrence teaches:

wherein each of said classifiers operates based on a characterizing vector
forming an input information for its respective classifier (Column 4, Lines 6-15);

Murray goes on to teach:

(e) merging (40) said classified images in accordance with an algorithm (Figure 1; Column 6, Lines 8-15) to perform a combined global evaluation for each class of said different object classes, for providing merged images (41A, 41B, 41C) (assessor unit, Column 5, Line 63 through Column 6, Line 15, see Fig. 1; Also teachings of Lawrence et al. concerning providing images of different portions of the face such as nose, mouth, etc.); and

(f) deciding (50), on the basis of said merged images, whether a pixel point of all remaining pixel points is still relevant and if so to which of said different object classes (C1 or CZ) each relevant pixel point belongs (Column 5, Lines 56-67, Column 6, Lines 1-18; Also the inherent characteristic of Lawrence et al. backpropagation neural network).

It would have been obvious to one of ordinary skill in the art to use the feature vector of Lawrence in the general feature extraction system of Murray to overcome the limitations of the prior art with regard to variations in scale, orientation, and illumination of the target image data versus the reference image data.

As per claim 2, Murray teaches:

providing a set of predetermined first criteria (greater homogeneity, Column 3, Lines 47-48) for performing said rough classifying step (a), and providing a second set of second predetermined (change of illumination intensity, Column 3, Lines 35-36) criteria for performing said filtering step (c).

As per claim 3, Murray does not teach forming characterizing vectors, however, Lawrence teaches:

further comprising acquiring vicinity (pixels around center pixel) image data representing a vicinity of a respective relevant pixel point of a corresponding filtered image, and forming said characterizing vector from said vicinity image data (Column 4, Lines 23-28). It would have been obvious to one of ordinary skill in the art to use the vicinity vectors of Lawrence in the feature extraction system of Murray because the vicinity vector data is partially invariant to variations in intensity of the image.

As per claim 6, Murray or Lawrence teach:

comprising using, as said group of different classifiers, a neural network (Murray, multi layer perceptron technique, Column 5, Lines 35-36, or Lawrence, figure 2, element 260, Column 3, 1. 2, "self-organizing map neural network") capable of learning (Lawrence, Column 4, Lines 31-36, with regard to Murray it is well-known that multi layer perceptron can be trained) for performing said step of further classifying (30).

As per claim 9, Murray teaches:

representing recognized objects by pixel clusters (clustering is used in K-Nearest Neighbor classification, Column 5, Lines 35-36) in an image (51) that represents a decision regarding said combined global evaluation while performing said deciding step (50) (assessor unit, Column 6, Lines 15-20, output 24, figure 1).

7. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murray and Lawrence as applied to claims 1 above, and further in view of Hutchenson et al., (hereinafter Hutchenson), US 5,465,308.

As per claim 4, Murray does not teach weighting. But Lawrence teaches that the a weighting factor can be added to each pixel to compensate for some invariance prior

to being sent to the neural network, but does not specifically address a weighting system for different classes. However, Hutchenson teaches:

comprising providing different weighting factors or evaluation numbers representing different classes of objects to be recognized (Rank vectors, Column 17, Lines 4655), and assigning or allocating certain weighting factors or evaluation numbers of said different weighting factors to each relevant pixel point (each feature component (e.g., pixel)) is thereby marking each relevant pixel point (as taught by Lawrence, Column 4, Lines 26-30) with regard to which of said different classes of objects the marked pixel point belongs.

As per claim 7, neither Murray nor Lawrence teach using the characterizing vectors to create rules for the neural network, however, Hutchenson teaches:

comprising selecting from relevant pixel points of said filtered images (21, 22, 23) characterizing or feature vectors representing features of said relevant pixel points of said rough classifying (10) (input feature vectors, Column 18, Lines 22-25), and forming rules (changing weights, Column 18, Lines 26-30) for said neural network from said characterizing or feature vectors.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray and Lawrence as applied to claims 1 above, and further in view of Knecht et al., (hereinafter Knecht), US 4,881,270.

As per claim 5, neither Murray nor Lawrence teach the limitations of claim 5, however, Knecht teaches:

sorting said vicinity image data in a spiral pattern into a vector of features (although Knecht teaches using rows and columns (Column 5, Lines 11-20) this is merely a design choice on how to present the data in vector form) into a vector of coefficients, applying a rapid (fast) Fourier transform (Column 5, Lines 34-40) to said vector of coefficients to form transformation coefficients (Column 5, Lines 52-54), and forming said characterizing vectors of an absolute value of said transform coefficients (Column 5, 1. 7-Column 6, 1. 7).

It would have been obvious to one of ordinary skill in the art to use the absolute values of Fourier transform coefficients as taught by Knecht in the system of Murray and

Lawrence because the well known Fourier power spectrum of the frequencies present in the image data axe easily manipulated as shown in Knecht's figure 5.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray and Lawrence as applied to claims 1 above, and further in view of Wang et al. (hereinafter Wang), "Automatic Target recognition Using a Feature-Decomposition and Data Decomposition Modular Neural Network".

As per claim 8, neither Murray nor Lawrence specifically teach using a statistical process for global evaluation, however, Wang teaches:

further comprising performing said merging step in accordance with a statistical process (fig. 8, summation for mixture of experts, p. 118, equations 16 and 17) for obtaining said global evaluation (final classification, p. 1118, Column 2 , and further comprising using in said statistical process information based at least on one of a type

(page 1119, Column 2, Lines 5-11), position and content of said received images (1) to be evaluated.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

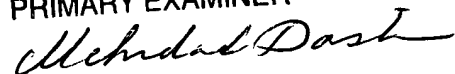
Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEHRDAD DASTOURI
PRIMARY EXAMINER



Mehrdad Dastouri
Primary Examiner
Art Unit 2623
April 18, 2004